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vation," he gives the following table, based on a survey of the Connecticut Western railroad, made in 1873 by Mr. E. N. Bradford:

Joy mount (Goshen)	1642 feet.
Haystack mount (Norfolk)	1672 "
Bald mount (Norfolk)	1770 "
Bradford mount (Canaan)	1910 "
Bear mount (Salisbury)	2100 "
Brace mount (Salisbury)	2300 "

——F. Gardiner, Jr., in a communication to *Science*, describes a natural bridge sixty-five feet long, fifteen feet wide where narrowest and two feet thick in the center, situated in a small cañon at a distance of about twenty miles from the Atlantic and Pacific railroad, near the boundary of Arizona and New Mexico.——Lieut. Hohm, of the Danish Greenland exploring expedition, separated from Dr. Eberlin at Tingmiarmint (62° 40′ N. lat.) with the intention of reaching Angmaksalik, in 65° N. lat., where there is a fixed settlement not hitherto visited by Europeans. The heathen East Greenlanders are as tall as the peoples of North Europe, and mostly have dark eyes and hair. They seem to have nothing in common with the Eskimo, yet their utter absence of Norse tradition and total want of civilization, is thought to preclude the possibility that they are descendants of the Norsemen.

GEOLOGY AND PALÆONTOLOGY.

THE RELATIONS OF THE PUERCO AND LARAMIE DEPOSITS.—Some writers having suspected the identity of the formations above named, and the consequence which follows, that the Puerco mammalian fauna was contemporary with the dinosaurian fauna of the Laramie age, the following observations on their stratigraphic relations are now given. They are derived from the notes of several years' residence and exploration by my correspondent, David Baldwin, which connect those made by myself in New Mexico in 1874, published in the Wheeler Survey Report, with those made by Holmes and Endlich in 1878 in Colorado, and published in the Hayden Survey Report.

At the locality where best developed, the Puerco beds have a thickness of about 850 feet, and contain Mammalia to the base (see NATURALIST for April and May, 1885). The Laramie beds succeed downwards, conformably it is thought by Mr. Baldwin; and have a thickness of 2000 feet at Animas City, New Mexico. They rest on Fox Hills marine Cretaceous of less thickness. A few fossils sent from time to time by Mr. Baldwin identify the Laramie. This is especially done by the teeth of the dinosaurian genus Dysganus Cope,[1] which is restricted to the Laramie formation everywhere. Also by the presence of the genera Lælaps and Diclonius, which in like manner do not extend upwards into the Puerco beds. The Lælaps is principally represented by teeth, which resemble those of the *L. incrassatus* Cope more than those of any other species, although these parts are not alone sufficient for the determination of species in this genus. The Dysganus agrees with the *D. encaustus* Cope, which, with the *Lælaps incrassatus*, was described from specimens from the Upper Missouri. A species of Trionyx and a large crocodile accompany these species. The latter differs in the character of its teeth from any species known to me. The crown is compressed at the apex, and there are two well-marked cutting edges, which slope in such a way as to divide equal faces unsymmetrically, *i. e.*, the greatest convexity of one not being opposite to that of the other; the transverse section resulting being an oblique oval, or at the base a regular oval, with cutting edges at points diagonal to each other. On one side of the tooth thus divided, the surface is grooved by twenty-five strong sulci, which become very fine at the obtuse apex of the tooth. The opposite (external ?) side of the crown is smooth, excepting traces of sulci and silky grooving towards and at the apex. Diameter of crown where broken off, anteroposterior, M. .0125; transverse, .009. No species of this character has come under my observation from the Laramie or any of the Tertiary formations. I name the species *Crocodilus stavelianus*, after Mr. J. Thomas Stavely, one of the enterprising publishers of the AMERICAN NATURALIST.

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[1] Proceedings Academy Philada., Oct., 1876.

It is thus evident that the Puerco formation is quite distinct from the Laramie, although it is possible that it may be proper to associate it with the Laramie in the Postcretaceous series.[1] When the Cretaceous mammalian fauna comes to be known, it will be very apt to agree with the Puerco in its leading features. These are, the absence of Perissodactyla and of Rodentia, and of course of mammalian orders not found below the Miocenes; and in the constitution of the mammalian fauna by Condylarthra, Bunotheria and Marsupialia exclusively. The Postcretaceous series as a whole may be ultimately distinguished from the tertiary by these peculiarities, together with the presence of the reptilian genus Champsosaurus.—*E. D. Cope.*

CROSBY'S CONTINENTS AND OCEAN BASINS.—W. O. Crosby (Proc. Bost. Soc. Nat. Hist.) discusses the origin and relations of continents and ocean basins. Reviewing the hypotheses of Thomson, Dana, Le Conte and others, he arrives at the conclusion that existing facts necessitate the existence of a plastic zone beneath the solid crust, this zone occupying the stratum at which temperature is highest in proportion to pressure. As the infiltration of water increases the tendency to fusion, it is probable that this plastic zone commences at a depth of about forty miles. The interior of the earth may have a rigidity exceeding that of steel, but even if, according to the ideas of Wadsworth and some others, the interior is liquid, this does not affect the action of the surface zone of liquid matter upon the solid crust above it. The two opposing theories of continent formation are thus stated: (1) Continents and ocean basins are upward and downward bendings of the earth's crust; (2) the continents and ocean basins are due to the greater conductivity and more rapid cooling of the continental portions of the earth's crust, hence they are permanent, and the continents are wider and the seas deeper now than at any former period. The hypothesis of the earth's unlike composition along different radii is necessary to the second theory, and is here stated to be unsupported by evidence. According to the former theory the grand distortion which the crust experiences before the strain becomes great enough to crush it, accounts for the continents, while the ultimate crushing produced the mountains.

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[1] This has been done in the table of formations in Vol. III U. S. Geol. Survey, F. V. Hayden, Tertiary Vertebrata, p. 42.

Mr. Crosby does not, therefore, believe in the permanency of continents, which is held by many geologists as an article of faith. We have, he argues, certain knowledge of a Palæozoic subsidence of 40,000 feet in the Alleghanies, a Mesozoic subsidence of 50,000 feet in Central Europe, and, according to King, a subsidence of 60,000 feet in the Rocky mountains. With these facts in mind how can it be held that any part of the floor of the deep sea ever has been or will be elevated to form dry land?

GEOLOGICAL NEWS.—*General.*—All the geological formations are met with in Japan, but the Palæozoic formations embrace the largest extent of territory. The Trias occurs in the north and south-west of the main island and in Shikoku. Chalk is also widely distributed in Niphon, Yezo and Shikoku. The Cenozoic occurs everywhere on the edges of the older mountain ranges. Basalt is rare, the volcanic rocks are mostly trachyte and andesite, and granite covers an area only second to that occupied by the Palæozoic formations. Volcanic tuff, consisting principally of decomposed silicates, is among the soils of Japan, and forms most of the uncultivated plains at the foot of the mountains. The geological and topographical survey of Japan has worked over an area of about eighty geographical miles square.

Palæozoic.—Mr. O. A. Derby states (Geog. Physica do Brazil, Vol. 1) that the Brazilian tablelands are composed of horizontal or nearly horizontal beds. The basis of the plateau consists of ancient metamorphic rocks; these form nearly the whole of the mountain and mountainous tablelands, and appear whenever later rocks have been denuded. They thus occur at the bottom of nearly all river valleys. The older of these rocks are highly crystalline, the newer less crystalline. The granites, syenite, gneiss, etc., of the first series is supposed to be Laurentian, while the quartzite schists and limestones, etc., of the second series are Huronian. The latter series is the great mineral repository of Brazil. Here occurs the schistose micaceous quartzite called itacolumite, itabirite, in which the mica is replaced by micaceous iron and extensive beds of hematite and other iron ores, and gold. Tapanhoacanga, consisting of masses of iron ore cemented by limonite, is often very rich in gold. The Serra do Espinhaço is capped with sandstone believed to be Silurian, and probably a part of the sandstones of the Sao Francisco-Tocantins divide are also Silurian. The tablelands of the Parana basin, composed of sandstone and shale with some limestone, are probably Devonian and Carboniferous. Devonian fossils characterize an extensive area in the Campos Geraes de Parana, while the Carboniferous covers a large region farther to the westward in the same province, and in Sta Catherina, Rio Grande do Sul and Southern and Western Sao Paulo. Coal has been found at various points. Immense dykes of diorite traverse these two formations, and by their decomposition afford a dark red soil called *terra roxa.*——O. A. Derby (*Am. Jour. of Science*, Sept., 1884) shows that the flexibility of itacolumite is only a surface quality. In a cutting upon the Rio and Minas railroad (Brazil) a thickness of forty meters of itacolumite is laid bare. The upper portion consists of massive beds from one to three meters thick, in which flexible portions are rarely found. In the lower part the beds readily divide into thin laminæ, most of which are more or less flexible. Exposures of unweathered itacolumite are rare, and from the study of this Mr. Derby concludes that flexibility is not an original characteristic of the rock but a phase of weathering brought about by percolating waters.

Silurian.—Sr. Leon Tourquist has published descriptions of 113 species and varieties of trilobites discovered in the Silurian basin of Siljan, in Dalecarlia. The descriptions mainly rest on detached heads and pygidia, as the fossils are fragmentary.

Carboniferous.—S. H. Scudder has described two new Carboniferous insects from England. One of these can with certainty be referred to Brongniart's group of Protophasmida. The wing is broadest in the middle, and from the appearance of the fragment, which is 75^{mm} long, must have had a length of 130^{mm}, so that the living insect probably possessed an expanse of wing of at least ten inches.

Cambrian.—Mr. W. O. Crosby (Proc. Bos. Soc. Nat. Hist.) defends his previous conclusions respecting the relations of the conglomerate and slate in the Boston basin. He maintains that the conglomerate underlies the slate, that there is essentially but one formation of conglomerate and one of slate; that both are Primordial, or at least Cambrian, and that the Boston basin contains no Carboniferous beds. He declares that the Carboniferous shales and sandstones are quite distinct lithologically from the slates of the Boston basin, which latter, as well as the conglomerate, are traversed in all directions by numerous and large dykes of trap or diabase, while no eruptive rocks have ever been discovered in the adjacent Carboniferous. The rocks are decidedly homogeneous, passing gradually into each other, and have also a general agreement in strike and dip. The conglomerate underlies the slate, not because it is older than the slate, but because it was deposited in shallow water, the slate in deeper, and the latter deposit commenced before the first was completed. In not a few instances the conglomerate can be seen to pass beneath the slate.

Jurassic.—A specimen found in the Waldean of Hastings (Eng.) throws some light on the structure of the sternum in Iguanidæ. It consists of an azygos bar, from near one end of which diverge two smaller rods which terminate mesially in expanded ends. Professor I. W. Hulke regards the diverging rods as clavicles, and the azygos bar as the interclavicle, and suggests that the costal sternum may have been cartilaginous.

Cretaceous.—M. Ch. Arnat (Rev. Scientifique) describes the geological structure of the Saharan district of M'zab. This principally consists of an elevated plateau (*hamada*) of Cretaceous rocks, rising toward the north-east into a cliff facing the basin of the Oued Loua, while toward the south-east it is lost beneath the alluvium of the Oued Rhir. Thus this rocky plateau, which is entirely desolate and without running water, is bounded east and west by alluvial deposits. Calcareous concretions mark the passage between the two formations. The few fossils indicate that the strata must be placed between the Gault and the white chalk (Turonian and Cenomanian). The calcareous crust forming the soil of the plateau is Taranian, while the escarpments formed by the marls, as well as the marly limestones, are Cenomanian.——Professor Lundgren, in his monograph of the Swedish Cretaceous Brachiopoda, states that the Cretaceous strata which occupy an extensive area in the province of Skeine, at the southern extremity of the country, have peculiar petrographic and palæontological characteristics in the three districts of Kristianstad, Ystad and Malmö. Those of Kristianstad are chiefly *gruskalk* (a limestone composed of the fine débris of shells of mollusks and echinoderms) with a mixture of quartz sand-grains and occasionally metamorphic boulders. In Ystad the prevailing rocks of the Cretaceous strata are incoherent calcareous sandstones, with a variable quantity of green grains; while in Malmö the beds are pure white chalk of various degrees of hardness, with abundant layers and nodules of flint. These Malmö beds are an easterly continuation of those of Denmark, and closely resemble those of

Norwich (Eng.). In Malmö the upper chalk is overlaid by the Danien, or newer chalk, which is without belemnites or Belemnitella. From the upper chalk the only new species described is a Lingula, but from other horizons there are sixteen new forms. The most prolific brachiopod fauna is the lower division of the Kristianstad district, characterized by *Actinocamax ventricosus.*

Tertiary.—Ernst Hoken has endeavored to ascertain the groups of fishes to which belong the otoliths, which are the most common remains of bony fishes in the Oligocene of North Germany. He finds the Gadidæ predominate, but identifies also species of Percidæ, Sciænidæ, Sparidæ, Triglidæ and Pleuronectidæ.——Although Professor Marsh's book on the Dinocerata bears date 1884, the first copy was received from the binders towards the end of February, 1885.——Mr. J. S. Gardner, in a lecture upon the Age of the Basalts of the North-east Atlantic, states that the determination of the Antrim basalts as Miocene is not satisfactory; and that the assumption that all floras comprising modern and temperate-looking genera (such as willow, beech, alder, hazel, poplar, elm, pine, liquidambar) must be Miocene, while a flora of palms, Proteaceæ, figs, Aralias, etc; must be Eocene, is erroneous. The whole of the American flora with Dicotyledons would have been absorbed into the Miocene had it not been for stratigraphical evidence. The so-called Miocene plants of Greenland are, by Mr. Gardner, referred to the middle Eocene, and the unfossiliferous beds below their horizon to the base of the Eocene. The basalts in Ireland restore the upper chalk. In conclusion Mr. Gardner said—"I think we may assume that the old land on which this flora (that of the middle series of the Irish basalts) grew formed a part of the continent of Europasia, in Eocene times, and further that it formed or was not distant from its western coast line." Mr. Gardner believes that the silicified wood and lignites of Lough Neagh, may be derived from the basalts. The prevailing conifers of these Eocene basalts are a cypress, a cryptomeria and a pine.

Post-Glacial.—W. O. Crosby (Proc. Bost. Soc. Nat. Hist.) gives what seems a very probable explanation of the gorge called Purgatory, at Sutton, Mass. The chasm is about 50 feet wide, with vertical walls, and pierces the micaceous gneiss of the region. He suggests that during some disturbance of the earth's crust, the wedge-shaped mass of rock between two master joints has dropped. This idea is in accord with facts. The chasm is parallel to a well-defined system of joints, and its walls are evidently joint-places. There are no evidences of marine erosion to support Dr. Hitchcock's theory. The date of this chasm must be post-glacial, as, if it lay in the path of the ice-sheet, it would have been filled with glacial detritus. The explanation will of course apply to some other similar gorges.

Quaternary.—Prof. A. Nehring (Sitz. Ges. naturf. Freunde, Berlin) asserts that the horse existed in Europe during the diluvial age. At that time middle Europe was a land of steppes, and a strong-kneed, thick headed, medium-sized wild horse existed there. Later on the steppe became covered with forest, the moist climate of which was unfavorable to the horse, which became confined to the pasture grounds and thus fell more and more under the influence of domestication, whilst it degenerated into the small weak-kneed horse found in the moors of Northern Germany, in some pile-dwellings, and in the "Kreisgruben" of Oldenburg. The descendants of this European horse can still be traced in some breeds. This view does not shut out the idea that the introduction of the Asiatic horse may have contributed to the change of type.

Recent.—Dr. R. v. Lendenfeld has found undoubted traces of glaciation throughout an area of 100 sq. miles upon the highest part of the Australian Alps, at elevations of above 5800 feet. The rocks showing traces of ice-action are all granite.

MINERALOGY AND PETROGRAPHY.[1]

TESCHNITE.—Dr. Carl Rohrbach[2] has made a thorough reëxamination of all the occurrences of teschnite of which he could obtain specimens, and concludes that this rock is not entitled to the position to which it was assigned by Rosenbusch in his system of rock classification published in 1877.

The paper opens with a valuable review of the literature of this much discussed rock-type. The best known localities are those in the neighborhood of Teschen, in Moravia, where the rock, as early as 1821, was described as a diorite. This determination appears to have been regarded as satisfactory until Hohenegger threw doubt on it, and in 1861 proposed to call this in many respects peculiar group of rocks "teschnite." This name was accepted by Tschermak, in 1866, for the lighter colored varieties, while he designated the darker ones as picrite. Zirkel, in 1868, and Tschermak, in 1869, first mentioned nepheline as a constituent of these rocks. In 1877 Rosenbusch published the results of his examination of these rocks, which he defined as pre-Tertiary plagioclase-nepheline aggregates, and as such assigned them a very important place in his classification. Other masses of a similar age and mineralogical composition have been described by Tschermak from the Caucasus, and by McPherson in Portugal. Analcite, supposed to be an alteration of the nepheline, is a common constituent at all of these localities.

As the principal primary constituents Dr. Rohrbach designates plagioclase, augite, hornblende, biotite, olivine, magnetite and apatite. The augite is called "automorphous" when it is present

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[1] Edited by Dr. GEO. H. WILLIAMS, of the Johns Hopkins Univ., Baltimore, Md.

[2] Ueber die Eruptivgesteine im Gebiet der schlesisch-mährischen Kreideformation. Tschermak's Min. u. Petr. Mitth., VII, pp. 1–63.